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(54) **Traction sheave elevator and machine space for a traction sheave elevator**

Treibscheibenaufzug und Maschinenraum für einen Treibscheibenaufzug

Ascenseur à poulie et positionnement du moteur pour un ascenseur à poulie

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(73) Proprietor: **Kone Corporation**  
**00330 Helsinki (FI)**

(72) Inventors:  
• **Aulanko, Esko**  
**FIN-04230 Kerava (FI)**  
• **Hakala, Harri**  
**FIN-05830 Hyvinkää (FI)**  
• **Musialahti, Jorma**  
**FIN-05620 Hyvinkää (FI)**

(74) Representative: **Wahl, Hendrik, Dr.-Ing.**  
**Zipse & Habersack,**  
**Wotanstrasse 64**  
**80639 München (DE)**

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- **PATENT ABSTRACTS OF JAPAN vol. 015 no. 171 (M-1108), 30 April 1991 & JP-A-03 036184 (TOSHIBA CORP) 15 February 1991,**
- **PATENT ABSTRACTS OF JAPAN vol. 950 no. 005 & JP-A-07 117957 (MITSUBISHI ELECTRIC CORP) 9 May 1995,**

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**EP 0 719 724 B1**

## Description

[0001] The present invention relates to a traction sheave elevator as defined in the preamble of claim 1.

[0002] One of the objectives in elevator development work has been to achieve an economic and efficient use of building space. Document DE-U-7395 discloses a traction sheave elevator with external machine room, wherein the machinery is placed with its upper most part within the shaft cross section. Aiming at efficient and economic systems, the applicant's previous Finnish patent applications no. 932975 priority document of EP-A 631 968, 941719, 942062 priority document of EP-A 680 920 as well as the European Patent present elevator solutions in which the machinery is placed in the shaft space or in a shaft wall without an external machine room or equivalent. However, for reasons of safety or other circumstances prevailing in the shaft, it is sometimes necessary to isolate the machine space from the elevator shaft. Especially in the case of fast elevators, it is necessary to prevent the propagation of noise generated by the hoisting machinery and traction sheave rope contact. The solutions presented in the applications mentioned above are advantageous in respect of elevator construction, but in themselves they are not always fully protected against dirt and dust that may be present in the shaft. Also, the question of preventing passage between the machine space and the rest of the shaft space has received little attention in them.

[0003] To meet the needs described above and to achieve a reliable elevator construction that is advantageous in respect of both economy and space utilization and whose space requirement in the building is substantially limited to the space required by the elevator car and counterweight on their paths, including safety distances, and by the passage of the hoisting ropes, a traction sheave elevator and a machine space for a traction sheave elevator are presented as an invention.

[0004] The traction sheave elevator of the invention is characterized by what is presented in the characterization part of claim 1. Other embodiments of the invention are characterized by what is presented in the other claims.

[0005] The advantages provided by the invention include the following:

- The hoisting machinery and associated equipment, placed in the shaft, are protected against any dirt and dust that may be present in the shaft space.
- Illicit access to the hoisting machinery and associated equipment from the shaft is prevented. Likewise, access from the machine room, hereinafter machine space, to the rest of the shaft can be prevented.
- The traction sheave elevator of the invention allows an obvious space saving in the building as no separate machine room outside the shaft is needed.
- The elevator is advantageous to install as the ma-

chine space and its equipment can be largely assembled and tested beforehand in factory.

- Being separated from the shaft space, the machine space damps noise proceeding from the hoisting machinery.
- Practical application of the invention does not require any big changes in the design and manufacture of the elevator.
- The machinery and instrument panel can be easily accessed, so that, as regards maintenance and rescuing, accessing the machinery is not substantially different from conventional elevators.

In the following, the invention is described by the aid of an application example by referring to the attached drawings, in which

- Fig. 1 presents a diagram representing a machine space as applied in the invention;
- Fig. 2 presents an elevator with machinery below, implemented according to the invention;
- Fig. 3 presents the layout of the main components of an elevator with machinery below, implemented according to the invention, projected in the cross-section of the elevator shaft, and
- Fig. 4 presents an elevator with machinery above, implemented according to the invention.

[0006] The diagram in Fig. 1 represents a cabinet type machine space 9 of a traction sheave elevator as provided by the invention. This figure shows the hoisting unit of a traction sheave elevator with machinery below, placed in a machine space 9, with hoisting ropes 3 going up from the traction sheave 7 of the hoisting machine 6. The hoisting machine 6 is mounted on the frame 20 of the machine space, which also forms the frame of the hoisting unit. Mounted on the frame 20 is also an instrument panel 8, which contains the elevator control equipment and the equipment required for the control of and supply of power to the electromotor comprised in the hoisting machine 6. The hoisting machine 6 is discoidal in shape and, in relation to its diameter, rather flat in the axial direction of the traction sheave. The traction sheave protrudes from discoidal hoisting machine 6. This type of elevator machinery does not require a large machine space, so it can easily be placed in an opening in a wall of the elevator shaft or in a recess in a shaft wall facing to the shaft, or in the elevator shaft between a shaft wall and the space required by the elevator car or an extension of said space. The machine space 9 may be assembled in advance, and it can contain a hoisting machine and/or other equipment installed in factory. It is also possible to assemble the machine space in the shaft on site. At least part of the wall of the cabinet-like machine space is preferably made of transparent material, making it possible to visually observe the operation of the machinery e.g. during servicing without opening a door or hatch leading to the machine

space.

[0007] Fig. 2 presents a diagrammatic view of an elevator with machinery below, implemented according to the invention, with a cabinet type machine space 9 placed at one of the side walls in the bottom part of the elevator shaft, between the elevator car 1 and the wall 15 of the shaft 17. The walls 14 of the machine space 9 are made of metal sheet or net, gypsum board or other suitable material. The cabinet sides facing to different directions may be made of different materials. For example, the ceiling and floor of the machine space may consist of metal sheet and the walls, of a net structure. The walls are provided with lead-through holes for the ropes 3, electric conductors etc. The machine space is provided with a door or hatch (not shown in the figure).

[0008] Fig. 3 illustrates the layout of the main parts of an elevator with machinery below, projected in the cross-section of the elevator shaft 17. The elevator car 1 moves along elevator guide rails 10 and the counterweight 2 moves along counterweight guide rails 11. The hoisting machine 6 with a control panel 8 is placed at a wall 15 of the elevator shaft 17. The traction sheave 7 protrudes from the hoisting machine 6. The passage of the hoisting ropes is guided by diverting pulleys 12 placed in the upper part of the shaft. One diverting pulley 12 guides the hoisting ropes from the traction sheave 7 to a diverting pulley 13 by means of which the counterweight 2 is suspended and from which the hoisting ropes go further to a fixed anchorage in the upper part of the shaft. Another diverting pulley 12 guides the hoisting ropes from the traction sheave 7 to diverting pulleys 4 and 5 mounted on the elevator car 1 and supporting the elevator car 1 on the ropes. From here, the hoisting ropes go to a fixed anchorage in the upper part of the shaft. In the figure, the hoisting ropes are indicated by their cross-sections on the traction sheave and diverting pulleys, but otherwise they are not shown. At each landing, the wall 16 of the elevator shaft is provided with an opening 18 for the landing door. The elevator car has a corresponding door opening 19. In elevators provided with a car door, the door opening 19 is closed with a car door.

[0009] Fig. 4 shows a diagram representing an elevator with machinery above, implemented according to the invention. The machine space 109 is located in the upper part of the elevator shaft 117, extending partly into the shaft wall in the form of a cut-out 110. The elevator machinery 106 is placed partly in the cut-out 110 in the wall 115 of the elevator shaft 117. The cut-out is open on the side facing to the shaft, but closed with a door 116 from the outside of the shaft. Protruding from the hoisting machine 106 into the shaft 117 is a traction sheave 107, which drives the hoisting ropes 103 (represented by dotted dashed lines). The figure shows the portion of the hoisting ropes that goes round the diverting pulleys 104, 105 under the elevator car 101 and the portion going from the traction sheave towards the counterweight. The machine space 109 is separated from the

shaft 117 by a wall 114 that covers the cut-out 110 on the side facing to the shaft. The wall is provided with an opening for the traction sheave 107, leading from the machine space 109 into the rest of the shaft space. Placed in the machine space is also an instrument panel 108. The instrument panel is preferably placed in its own cabinet or otherwise separated from the rest of the machine space. To damp the noise generated by the machinery, it is advantageous to line the machine space with noise absorbing material, e.g. felt board or the like.

[0010] It is obvious to a person skilled in the art that different embodiments of the invention are not restricted to the examples presented above, but that they may instead be varied in the scope of the following claims. For instance, the wall separating the machine space from the rest of the shaft can be provided with other openings besides those needed to provide access to the machine space and lead-throughs for parts of the elevator system. It is also obvious to the skilled person that in a clean elevator shaft the machine space need only protect persons and/or prevent passage between the machine space and the rest of the shaft space, in which case a machine space formed by a railing or the like and having no top cover may be sufficient to achieve the desired effect. It is further obvious to the skilled person that an elevator with machinery above and an elevator with machinery below can equally well be implemented using a machine space placed in a cut-out in a shaft wall, and that it is likewise possible to use a cabinet type machine space in the case of an elevator with machinery above as well as an elevator with machinery below.

[0011] It is also obvious to the skilled person that it must preferably be possible to access the inside of the machine space without hindrance from the counterweight or elevator car in any position on their paths. In cases where passage or access to a machine space placed inside the building space required by the shaft space and shaft wall structures together is not effected via a separate opening in a shaft wall leading out of the shaft or e.g. via a hatch provided beside the door, it will be preferable to make such arrangements regarding placement of the parts, opening direction of the aperture for passage or access etc. that the machinery and associated equipment can always be accessed by service personnel.

#### Claims

1. Traction sheave elevator comprising an elevator car (1,101) moving along elevator guide rails (10), a counterweight (2) moving along counterweight guide rails (11), a set of hoisting ropes (3,103) on which the elevator car and counterweight are suspended in the elevator shaft (17,117) and a drive machine unit (6,106) driving a traction sheave (7,107) connected to the drive machine unit (6,106) and acting on the hoisting ropes (3,103), charac-

- terized in that the drive machine unit (6,106) is placed in a machine room (9,109) provided in the elevator shaft (17,117) or in the elevator shaft (17,117) and its shaft wall (15,115) so as to lie completely on the same side of the elevator shaft wall surface facing outwards from the elevator shaft as the elevator shaft itself, said machine room being provided for taking up the drive machine unit (6,106) or the drive unit (6,106) and its instrument panel (8,108) and being substantially separated with a wall (14,114) from the rest of the shaft space.
2. Traction sheave elevator according to claim 1, characterized that the machine room (9,109) is completely within the elevator shaft (17,117).
  3. Traction sheave elevator according to claim 1 or 2, characterized in that the machine room (9,109) in the elevator shaft (17,117) is contiguous with a wall (15,115) of the elevator shaft.
  4. Traction sheave elevator according to any one of the preceding claims, characterized in that the machine room (9,109) is located in the lower part of the elevator shaft (17,117).
  5. Traction sheave elevator according to any one of claims 1,2 or 3, characterized in that the machine room (9,109) is located in the upper part of the elevator shaft (17,117).
  6. Traction sheave elevator according to any one of the preceding claims, characterized in that the machine room (9,109) is located between a wall (15,115) of the elevator shaft and the space required by the elevator car (1,101) on its path or an extension of this space.
  7. Traction sheave elevator according to any one of the preceding claims, characterized in that the machine room (9,109) is a cabinet type structure.
  8. Traction sheave elevator according to any one of the preceding claims, characterized in that the machine room (9,109) contains a space required for the instrument panel (8,108) of the elevator, separated from the space needed for the drive machine (6,106).
  9. Traction sheave elevator according to any one of the preceding claims, characterized in that the machine room (9,109) is lined with noise absorbing material.
- Patentansprüche**
1. Treibscheibenaufzug mit einer Aufzugkabine (1,101), die sich entlang von Aufzugführungsschienen (10) bewegt, einem Gegengewicht (2), das sich entlang von Gegengewichtführungsschienen (11) bewegt, einem Satz von Aufzugseilen (3,103), an denen die Aufzugkabine und das Gegengewicht in dem Aufzugschacht (17,117) aufgehängt sind und eine Antriebsmaschineneinheit (6,106), die eine mit der Antriebsmaschineneinheit (6,106) verbundene und auf die Aufzugseile (3,103) wirkende Treibscheibe (7,107) antreibt, dadurch gekennzeichnet, daß die Antriebsmaschineneinheit (6,106) in einem Maschinenraum (9,109) angeordnet ist, der in dem Aufzugschacht (17,117) oder in dem Aufzugschacht (17,117) und seiner Schachtwand (15,115) angeordnet ist, so daß er völlig auf derselben Seite der vom Aufzugschacht nach außen weisenden (äußeren) Schachtwandoberfläche liegt wie der Aufzugschacht selbst, wobei der Maschinenraum vorgesehen ist, um die Antriebsmaschineneinheit (6,106) oder die Antriebseinheit (6,106) und seine Instrumententafel (8,108) aufzunehmen, und der Maschinenraum im wesentlichen mit einer Wand (14,114) vom Rest des Schachtraumes separiert ist.
  2. Antriebsscheibenaufzug nach Anspruch 1, dadurch gekennzeichnet, daß sich der Maschinenraum (9,109) völlig innerhalb des Aufzugschachtes (17,117) befindet.
  3. Antriebsscheibenaufzug nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Maschinenraum (9,109) in dem Aufzugschacht (17,117) an eine Wand (15,115) des Aufzugschachtes angrenzt.
  4. Antriebsscheibenaufzug nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Maschinenraum (9,109) im unteren Teil des Aufzugschachtes (17,117) angeordnet ist.
  5. Antriebsscheibenaufzug nach einem der Ansprüche 1,2 oder 3, dadurch gekennzeichnet, daß der Maschinenraum (9,109) im oberen Teil des Aufzugschachtes (17,117) angeordnet ist.
  6. Antriebsscheibenaufzug nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Maschinenraum (9,109) zwischen einer Wand (15,115) des Aufzugschachtes und dem von der Aufzugkabine (1,101) auf ihrem Weg benötigten Raum oder einer Erweiterung dieses Raumes angeordnet ist.
  7. Antriebsscheibenaufzug nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Maschinenraum

(9, 109) schrankförmig ist.

8. Antriebsscheibenaufzug nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Maschinenraum (9, 109) einen Raum für die Instrumententafel (8, 108) des Aufzugs aufweist, der von dem für die Antriebsmaschine (6, 106) benötigten Raum separiert ist.
9. Antriebsscheibenaufzug nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Maschinenraum (9, 109) mit einem geräuschkämmenden Material ausgekleidet ist.

#### Revendications

1. Ascenseur à entraînement par poulie comprenant une cabine d'ascenseur (1, 101) se déplaçant le long de rails de guidage d'ascenseur (10), un contrepoids (2) se déplaçant le long de rails de guidage de contrepoids (11), un jeu de câbles de levage (3, 103) auxquels la cabine d'ascenseur et le contrepoids sont suspendus dans la cage d'ascenseur (17, 117) et une unité de machine d'entraînement (6, 106) entraînant une poulie d'entraînement (7, 107) reliée à l'unité de machine d'entraînement (6, 106) et agissant sur les câbles de levage (3, 103), caractérisé en ce que l'unité de machine d'entraînement (6, 106) est placée dans une salle des machines (9, 109) réalisée dans la cage d'ascenseur (17, 117) ou dans la cage d'ascenseur (17, 117) et sa paroi de cage d'ascenseur (15, 115) de façon à se situer complètement du même côté de la surface de paroi de cage d'ascenseur faisant face vers l'extérieur à partir de la cage d'ascenseur comme la cage d'ascenseur elle-même, ladite salle des machines étant prévue pour accueillir l'unité de machine d'entraînement (6, 106) ou l'unité d'entraînement (6, 106) et son panneau d'équipement (8, 108) et étant sensiblement séparée par une paroi (14, 114) du reste du volume de la cage d'ascenseur.
2. Ascenseur à entraînement par poulie selon la revendication 1, caractérisé en ce que la salle des machines (9, 109) est complètement à l'intérieur de la cage d'ascenseur (17, 117).
3. Ascenseur à entraînement par poulie selon la revendication 1 ou 2, caractérisé en ce que la salle des machines (9, 109) dans la cage d'ascenseur (17, 117) est contiguë à une paroi (15, 115) de la cage d'ascenseur.
4. Ascenseur à entraînement par poulie selon l'une quelconque des revendications précédentes, ca-

ractérisé en ce que la salle des machines (9, 109) est située dans la partie inférieure de la cage d'ascenseur (17, 117).

5. Ascenseur à entraînement par poulie selon l'une quelconque des revendications 1, 2 ou 3, caractérisé en ce que la salle des machines (9, 109) est située dans la partie supérieure de la cage d'ascenseur (17, 117).
6. Ascenseur à entraînement par poulie selon l'une quelconque des revendications précédentes, caractérisé en ce que la salle des machines (9, 109) est située entre une paroi (15, 115) de la cage d'ascenseur et le volume requis par la cabine d'ascenseur (1, 101) sur son trajet ou une extension de ce volume.
7. Ascenseur à entraînement par poulie selon l'une quelconque des revendications précédentes, caractérisé en ce que la salle des machines (9, 109) a une structure du type armoire.
8. Ascenseur à entraînement par poulie selon l'une quelconque des revendications précédentes, caractérisé en ce que la salle des machines (9, 109) contient un volume requis pour le panneau d'équipement (8, 108) de l'ascenseur, séparé du volume requis pour la machine d'entraînement (6, 106).
9. Ascenseur à entraînement par poulie selon l'une quelconque des revendications précédentes, caractérisé en ce que la salle des machines (9, 109) est revêtue d'une matière absorbant les bruits.

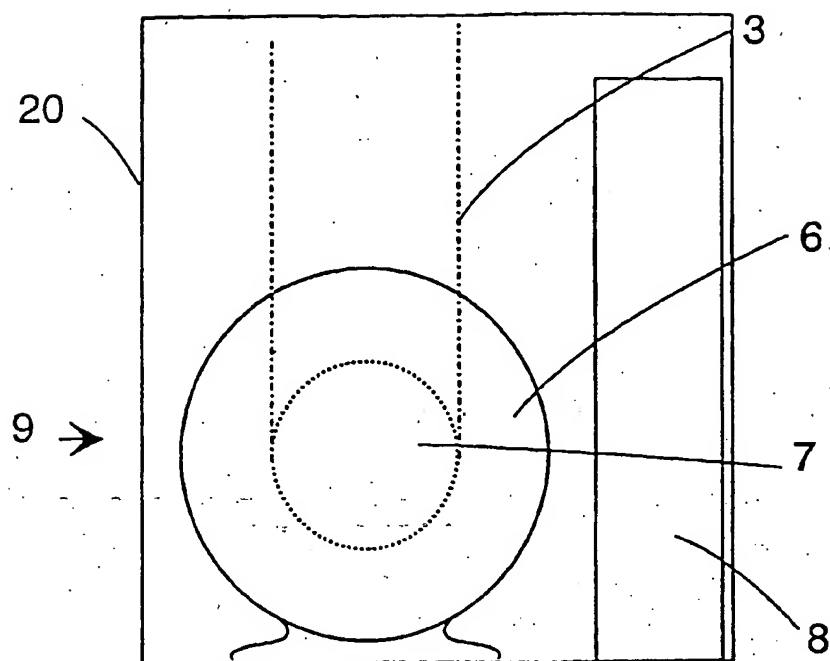


Fig. 1

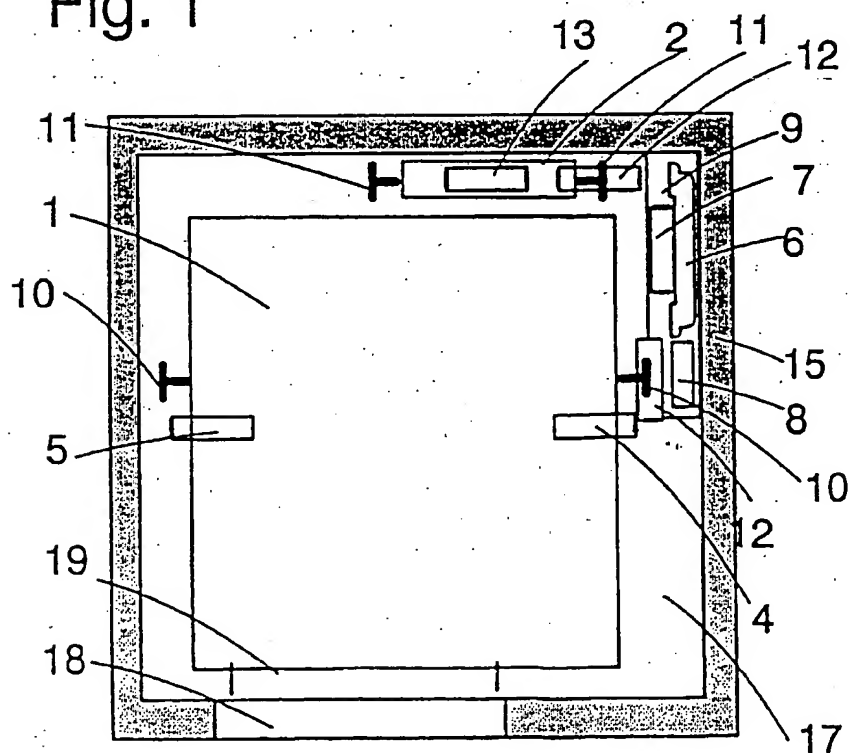


Fig. 3

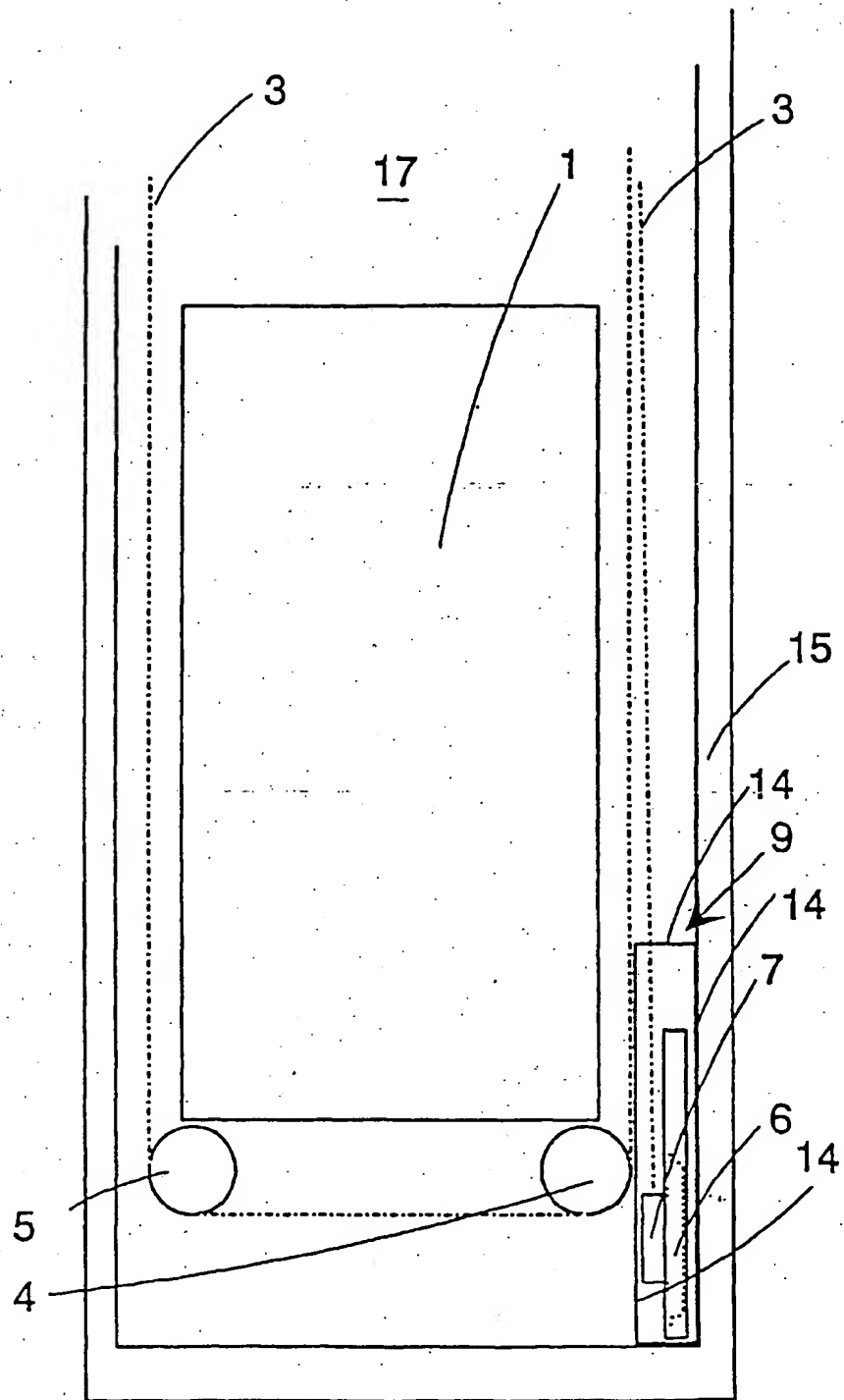


Fig. 2

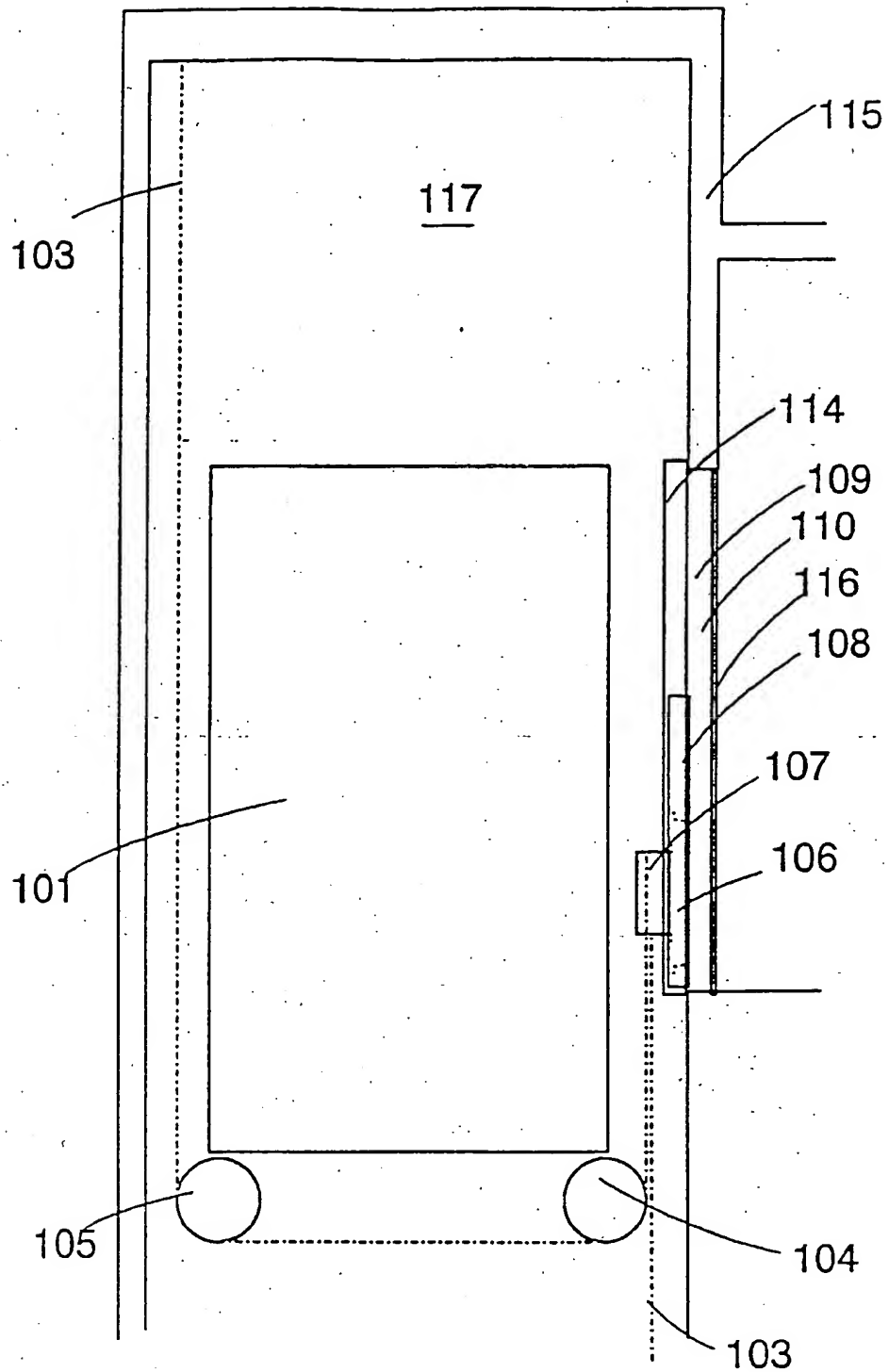


Fig. 4